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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,770	02/25/2002	George G. Barclay	51064	4422

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EDWARDS & ANGELL, LLP  
P.O. BOX 9169  
BOSTON, MA 02209

EXAMINER

THORNTON, YVETTE C

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 08/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicati n N .

10/082,770

Applicant(s)

BARCLAY ET AL.

Examiner

Yvette C. Thornton

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– The MAILING DATE of this communication appears n the cover sheet with the correspondenc address –  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 February 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20,24 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20,24 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7. 6) ☐ Other:

### DETAILED ACTION

This is written in reference to application number 10/082770 filed on February 25, 2002 and published as US 2003/0031949 A1 on February 13, 2003.

#### *Priority*

1. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged.

#### *Preliminary Amendments*

2. The preliminary amendments filed on February 25, 2002 have been entered and fully considered.
3. Claims 21-23 and 26-40 have been cancelled. Claims 1-20 and 24-25 are currently pending.

#### *Information Disclosure Statement*

4. The Information Disclosure Statement filed on November 13, 2002 has been entered and fully considered.

#### *Claim Rejections - 35 USC § 102*

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

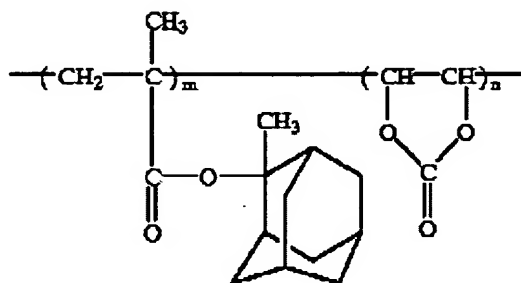
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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6. Claims 1-3, 11-12, 17-20 and 24-25 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Nozaki et al. (US 6013416 A). Example 71 of Nozaki exemplifies the synthesis of a copolymer of 2-methyl-2-adamantyl methacrylate and vinylcarbonate



represented by formula:

(c. 70, l. 42-c. 71, l. 2). The

said copolymer is admixed with triphenylsulfonium triflate as a photoacid generator. The said mixture was dissolved in ethyl lactate to make a resist solution. The said solution was spin-coated on a silicon substrate, pre-baked, exposed, post-exposure baked and developed to form a positive pattern (c. 71, l. 5-28). It is the examiner's position that vinylcarbonate meets the limitation of a carbonate unit fused to the polymer backbone as set forth in instant claims 1 and 2. 2-methyl-2-adamantyl methacrylate meets the limitations of an acrylate comprising a photoacid labile group separate from the carbonate as in instant claims 3 and 11-12. The taught silicon wafer meets the limitations of the claimed microelectronic wafer substrate as set forth in instant claim 24.

7. Claims 1-6, 10, 12-20 and 24-25 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Jung et al. (US 6132926 A). Jung teaches a photoresist including a copolymer prepared from bicycloalkene derivative, maleic anhydride and/or vinylene carbonate, which has a molecular weight ranging from 3,000-100,000 (abstract). Jung exemplifies the synthesis of a terpolymer comprising 2-hydroxyethyl 5-norbornene-2-carboxylate, t-butyl 5-

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norbornene-2-carboxylate and vinylene carbonate (ex. III; c. 5, l. 23-36). A positive photoresist composition useful for forming positive fine patterns in semiconductor devices may be obtained by mixing the photoresist copolymer of the taught invention with a photoacid generator in an organic solvent in a typical manner. The photoresist solution is spin-coated on a silicon wafer, which is, then soft-baked. An exposure process is carried out by use of a stepper, which employs deep UV or excimer laser as a light source. Thereafter, the wafer is post-baked and developed to form an ultrafine positive image (c. 3, l. 60-c. 4, l. 17). It is the examiner's position that vinylene carbonate meets the limitation of a carbonate unit fused to the polymer backbone as set forth in instant claims 1 and 2. T-butyl 5-norbornene-2-carboxylate meets the limitations of an alicyclic acrylate comprising a photoacid labile group as in instant claims 3-6, 10 and 12. The taught silicon wafer meets the limitations of the claimed microelectronic wafer substrate as set forth in instant claim 24.

Although Jung fails to exemplify a polymer comprising both vinylene carbonate and maleic anhydride, it does teach that maleic anhydride and/or vinylene carbonate can be used. One of ordinary skill in the art would readily envisage a polymer such as that exemplified in example III comprising 2-hydroxyethyl 5-norbornene-2-carboxylate, t-butyl 5-norbornene-2-carboxylate, maleic anhydride and vinylene carbonate as set forth in instant claims 13-14.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject

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matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki et al. (US 6013416 A) as applied to claims 1-3, 11-12, 17-20 and 24-25 above, and further in view of Barclay et al. (US 6306554 B1). Nozaki, as discussed above, teaches all the limitations of the claims except it fails to teach the use of a heterocyclic group in addition to the taught carbonate or lactone unit.

Barclay teaches a polymer that contains a heterocyclic ring, preferably an oxygen- or sulfur-containing ring. The heterocyclic ring is preferably fused to the polymer backbone (see abstract). Preferred heterocyclic units may be substituted by heteroalkyl groups such as ethers, alkyl thios, alkylsulfinyls and alkylsulfonyls. It has been found that such substituents can provide enhanced lithographic results, particularly substrate adhesion (c. 2, l. 57-65). Barclay teaches that the use of such polymer units can provide highly resolved relief images upon exposure to extremely short wavelengths, particularly sub 200 nm wavelengths such as 193 nm (c. 2, l. 33-39). One of ordinary skill in the art would have been motivated by the teachings of Barclay to incorporate a heterocyclic ring, preferably an oxygen- or sulfur-containing ring into the exemplified polymer of Nozaki in order to obtain a photoresist composition that can provide highly resolved relief images upon exposure to extremely short wavelengths. Furthermore, one of ordinary skill in the art would have been motivated to use a heteroalkyl substituted heterocyclic ring in order to enhance substrate adhesion.

10. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung et al. (US 6132926 A) as applied to claims 1-6, 10, 12-20 and 24-25 above, and further in view of Barclay et al. (US 6306554 B1). Jung, as discussed above, teaches all the limitations of the

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claims except it fails to teach the use of a heterocyclic group in addition to the taught carbonate or lactone unit.

Barclay teaches a polymer that contains a heterocyclic ring, preferably an oxygen- or sulfur-containing ring. The heterocyclic ring is preferably fused to the polymer backbone (see abstract). Preferred heteroalicyclic units maybe substituted by heteroalkyl groups such as ethers, alkyl thios, alkysulfinyls and alkylsulfonyls. It has been found that such substituents can provide enhanced lithographic results, particularly substrate adhesion (c. 2, l. 57-65). Barclay teaches that the use of such polymer units can provide highly resolved relief images upon exposure to extremely short wavelengths, particularly sub 200 nm wavelengths such as 193 nm (c. 2, l. 33-39). One of ordinary skill in the art would have been motivated by the teachings of Barclay to incorporate a heterocyclic ring, preferably an oxygen- or sulfur-containing ring into the exemplified polymer of Jung in order to obtain a photoresist composition that can provide highly resolved relief images upon exposure to extremely short wavelengths. Furthermore, one of ordinary skill in the art would have been motivated to use a heteroalkyl substituted heterocyclic ring in order to enhance substrate adhesion.

### *Conclusion*

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamahara et al. (US 6403280 B1) pertaining to radiation sensitive resin compositions (see ex. 7-8 and 11).

Jung et al. (US 6316565 B1) pertaining to amide or imide introduced copolymers, preparation thereof and photoresist composition comprising the same.

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Jung et al. (US 6045967 A) pertaining to a method and device using ArF photoresist (see ex. II).

Culbertson et al. (US 4384093 A) pertaining to copolymers derived from 1,3-dioxepins and maleic anhydride.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yvette C. Thornton whose telephone number is 703-305-0589. The examiner can normally be reached on Monday-Thursday 8-6:30.

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet C. Baxter can be reached on 703-308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

14. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.

  
Yvette Clarke Thornton  
Junior Examiner  
Art Unit 1752

yct  
August 18, 2003